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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,651	06/26/2003	Masashi Okubo	0038-0411P	4039
2292	7590	10/15/2004	EXAMINER	
BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			MULLINS, BURTON S	
			ART UNIT	PAPER NUMBER
			2834	

DATE MAILED: 10/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/603,651	Applicant(s) OKUBO ET AL.	
	Examiner Burton S. Mullins	Art Unit 2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 June 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. 35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are: p.2, lines 4, 6, 11, 16-20 and 23.

Drawings

3. Figure 7 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuhlmann-Wilsdorf et al. (US 6,245,440) in view of Iijima (US 5,830,326). Kuhlmann-Wilsdorf teaches the prior art carbon (graphite) fiber brushes 10 (c.10, line 23) fixed to slide against commutator pieces 4/15 in a motor (Figs.1A/7A). Though Kuhlmann-Wilsdorf disclose minature brushes (c.21, lines 6-12), Kuhlmann-Wilsdorf differs in that the carbon fiber does not comprise nanofibers or nanotubes.

Iijima teaches carbon (graphite) nanofiber filaments comprising nanotubes formed by tubular lattices with carbon hexagons arranged in a helical structure (Fig.3). The outer lattice is inherently electrically conductive since it is made of graphite. Iijima notes that such carbon structures may be used in carbon brushes (c.1, line 30). Iijima's nanofiber/nanotube filaments exhibit higher mechanical strength than normal graphite filaments (c.4, lines 63-66).

It would have been obvious to modify Kuhlmann-Wilsdorf and provide carbon nano fibers per Iijima since the carbon nano fiber filaments would have been desirable due to their higher mechanical strength.

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Regarding claims 2 and 8, the brush of the combination inherently provides a power feeding mechanism to motors, generators, for example, as mentioned in Kuhlmann-Wilsdorf c.1, lines 15-67.

Regarding claims 3 and 9, the nanofibers/nanotubes of Kuhlmann-Wilsdorf and Iijima would inherently comprise an abrasable layer. See Kuhlmann-Wilsdorf Fig.6, which shows individual fibers 8 abrading commutator piece 4.

Regarding claims 4 and 10, Kuhlmann-Wilsdorf discloses spiral springs for loading the brushes in inexpensive applications (c.24, lines 36-41).

Regarding claims 5 and 11, Kuhlmann-Wilsdorf notes that silver or copper powders may be mixed with other fiber strands for controlling the distribution and concentration of rigid bonds within the brush interior (c.14, lines 30-47).

Regarding claims 6 and 12, the carbon bonds in Iijima are the type that form graphite. Similarly, Kuhlmann-Wilsdorf's carbon fibers comprise graphite.

Regarding claims 7, 13 and 14, the outermost cylindrical layer a3 (Fig.2) of Iijima's nanotubes comprise electrically conductive graphite.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Dresselhaus et al., *Science of Fullerenes and Carbon Nanotubes*, Chap.20, pp.870-917 provides a brief summary of the state of the art of nanotubes. The Iijima "Nature" article from *Physics and Chemistry of Fullerenes* is an oft-cited, seminal article on graphite nanotubes related to Iijima 5,830,326.

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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Burton S. Mullins whose telephone number is 571-272-2029. The examiner can normally be reached on Monday-Friday, 9 am to 5 pm. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Burton S. Mullins
Primary Examiner
Art Unit 2834

bsm
14 October 2004